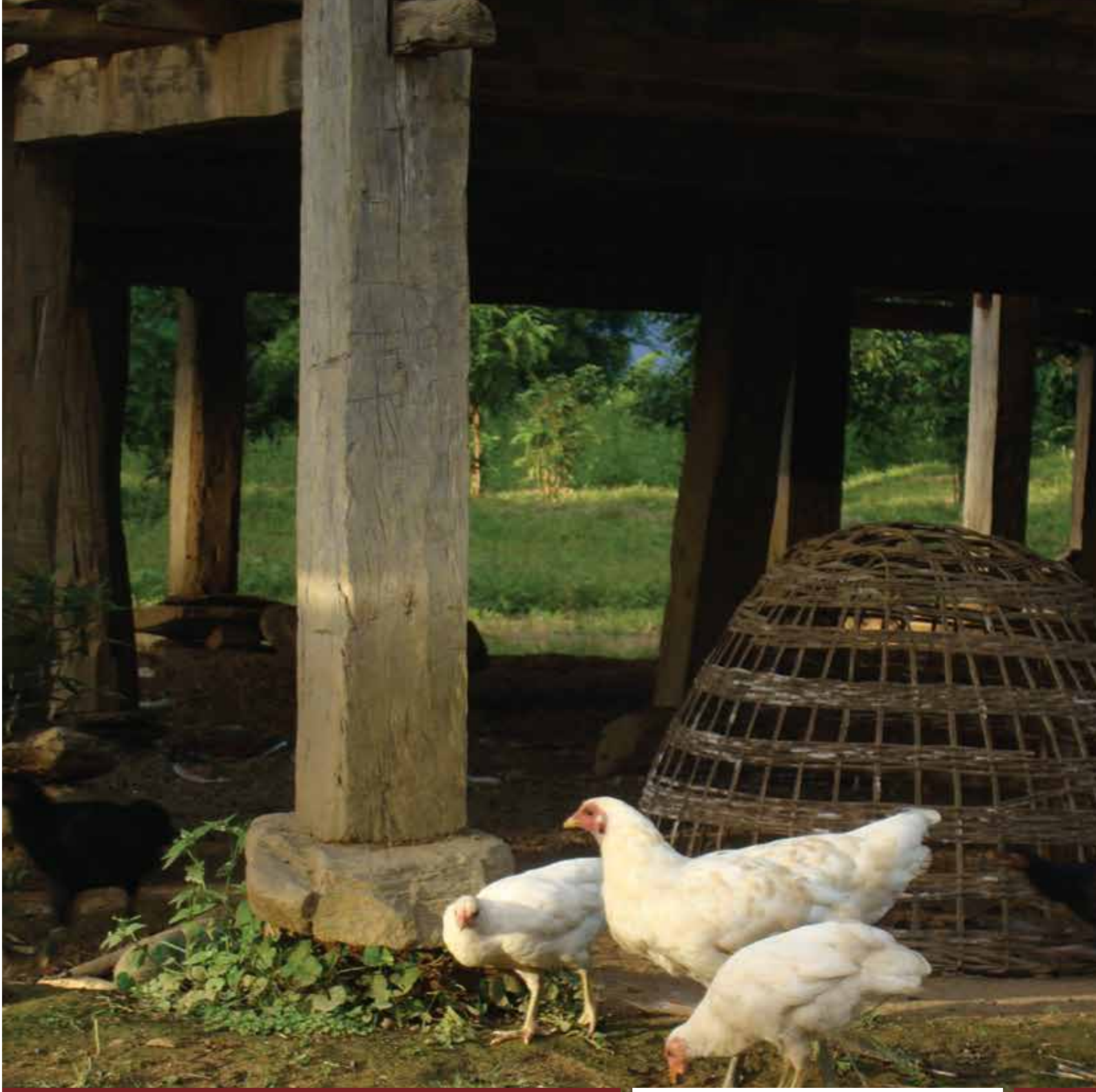

Household baseline data in Nigeria: Monitoring delivery of chicken genetic gains

CGIAR RESEARCH PROGRAM ON Livestock

ILRI RESEARCH REPORT 47


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Household baseline data in Nigeria: Monitoring delivery of chicken genetic gains

African Chicken Genetic Gains: A platform for testing, delivering and continuously improving tropically-adapted chickens for productivity growth in sub-Saharan Africa

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July 2018

ILRI thanks all donors and organizations which globally supports its work through their contributions to the CGIAR Trust Fund

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Cover photo—ILRI/Susan MacMillan

ISBN: 92–9146–560-7

Citation: Alemayehu, T., Bruno, J., Poole. J., Getachew, F., Sonaiya, E.B., Bamidele, O., Adebambo, O., Adeyinka, I.A. and Dessie, T. 2018. *Household baseline data in Nigeria: Monitoring delivery of chicken genetic gains.* ILRI Research Report 47. Nairobi, Kenya: International Livestock Research Institute (ILRI).

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Acknowledgements

The authors are grateful to the support provided by the Obafemi Awolowo University, Federal University of Agriculture, Abeokuta (FUNAAB) and National Animal Production Research Institute which implemented the household producer level baseline survey in the different states of the country. Particular thanks go to Emmanuel Babafunso Sonaiya, Professor Olufunmilayo Adebambo, Professor Isaac Adetunji Adeyinka, Oladeji Bamidele and the regional project subnational coordinators (SNCs) who were instrumental in the successful implementation of the baseline data collection process. Many thanks also go to the International Livestock Research Institute's (ILRI's) African Chicken Genetic Gains (ACGG) team based at the Addis Ababa office and the Research Methods Group team based at the Nairobi office for their role during the training workshops including the baseline conceptualization, design, development of training materials for enumerators, supervisors and SNCs, data collection process, delivery of training and the development of a sampling strategy for the survey. Our gratefulness is also extended to those who reviewed the report at different stages of its development.

Most importantly, we would like to acknowledge the hospitality and passion displayed by smallholder chicken keepers, supervisors and enumerators who were involved in the baseline survey. Participation in the interview sessions was time demanding, however, it was willingly given. It is hoped that the output of this study will assist ILRI and national partners in further improving the quality of the on-farm experimental design, thereby eventually benefiting poultry keepers throughout the country. It is clear that this project brings many people and institutions together who have made substantial contributions to the study. Any mistakes and omissions, however, are the responsibility of the authors.

This research was funded in part by the Bill & Melinda Gates Foundation (BMGF) (Grant Agreement OPP1112198) under the auspices of ILRI. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the BMGF.

Acronyms

ACGG	African Chicken Genetic Gains
BMGF	Bill & Melinda Gates Foundation
CHI	Cashpor Housing Index
NGN	Nigeria naira
FCS	Food consumption score
FUNAAB	Federal University of Agriculture, Abeokuta
HDDS	Household dietary diversity score
IDDS	Individual dietary diversity score
ILRI	International Livestock Research Institute
ODK	Open Data Kit
SNC	Subnational coordinators
TLU	Tropical livestock unit

Executive summary

This summary presents the main results of the ACGG baseline survey data in Nigeria. The survey was conducted in 60 rural villages of the country. The study villages were selected randomly from the long list of villages in each cluster of villages in Kwara, Rivers, Imo, Nasarawa and Kebbi states, which are called subnational zones in the project. The subnational zones represent different agro-ecologies in the country. The cross-sectional baseline study covered a total of 1,202 households. Following a description of the survey design and tools,[1] the study presents the main findings in the form of cross-tabulation, rank-index, tables and figures.

The study revealed that only 26.4% of the sample households were female-headed. For the entire sample, the average number of years of schooling, family size and age of the household head were 7.8, 6.5 and 54.45, respectively. The mean adult chicken-flock size per household was found to be 28 chickens. The flock structure and composition were dominated by chicks followed by hens. Almost all households—88%—in the study area had experience of providing supplementary feeding (i.e. any feed that was not scavenged) to their chickens at any time of the year. Good physical appearance, better meat taste, large body size and less illness were the most important traits in choosing good cockerels. For good hens, production of more eggs, produce chicks with high survival rate and less illness were the most important traits identified by the households. The results of the study also indicated that chickens were kept for multiple purposes and objectives, with egg consumption and live adult chicken sale rated the highest.

The average quarterly household income from all sources was sizably lower in Kwara and highest in Rivers subnational zones. Households in Kwara and Rivers reported a mean quarterly income of Nigeria naira (NGN) 28,738 and NGN52,064, respectively. Among all subnational zones, the average quarterly income of households from all sources was found to be about NGN34,154. The contribution of poultry to the total household income was found to be 48.4%. Regarding gender disaggregated ownership of all livestock species, ownership was either owned by male or female or jointly owned with spouse. Across the subnational zones, the livestock ownership pattern is dependent upon the type of livestock owned. The overall result of the survey indicated that goats, ducks and guinea fowl are dominantly owned by women whereas cattle, sheep and donkey are dominantly owned by men. Compared to women, men owned more farm and household assets, although joint ownership was significantly higher than individually owned assets. For the entire sample, livestock contributes to the household's asset index an average of 6.69%.

Across the subnational zones, out of the total sampled households, 95%, 89%, 85%, 40% and 59% of the respondents in Kwara, Rivers, Imo, Nasarawa and Kebbi, respectively, reported that they had enough food in the previous 12 months before the survey. Overall, 74% of the sample respondents reported that they had adequate food in the last 12 months for their household. Most households in the project subnational zones had acceptable Food Consumption Scores (FCS) of more than 35. An FCS range between 21.5 and 35 is borderline while any number below 21 constitutes a poor FCS. For the entire sample, the individual dietary diversity score (IDDS) across the subnational zones, was found to be relatively higher for index children than men and women.

1 http://acgg.wikispaces.com/file/view/Final%20ACGG%20Framework%20Site%20Selection28Dec15.pdf/571135015/Final%20ACGG%20Framework%20Site%20Selection28Dec15.pdf

Chicken and egg consumption in the three months before the survey indicated that chicken consumption was highest in Rivers and lowest in Kwara subnational zones. On average, households in Rivers consumed four birds per three months while in Kwara the number was three birds per three months. The general average across the subnational zones indicates that households consumed on average 3.85 birds per three months. Egg consumption was high in Imo and low in Kebbi. The average egg consumption in Imo was 32 eggs per three months while in Kebbi, the average egg consumption was five eggs per three months. Across the subnational zones, the average egg consumption was 15 eggs per three months.

Labour allocation for chicken activities by the different household members indicated that on average adult women spent 94.26 minutes in a week on chicken activities. Next to women, adult men spent more time than children and hired labour. On average, adult men spent 46 minutes per week on chicken activities. Almost more than half of the sample households—76%—reported that money accrued from the sale of chicken was used for covering household basic needs.

The information generated from the baseline survey informed the design and implementation of the longitudinal (on-farm) study. It is our intent that the information generated in this report will support future chicken research and development activities. In addition, the procedures followed and the baseline tools developed can be adapted for similar purposes outside the ACGG subnational areas. Finally, the data provide a useful reference to study similar cases.

Keywords: Chicken; Nigeria; subnational zones; African Chicken Genetic Gains; longitudinal study

1. Introduction

Indigenous chicken plays a significant role in the livelihoods of people and it contributes significantly to the food security of rural communities (Tadelle et al. 2003; Danda et al. 2010; Mutombo 2014). Poultry in rural areas of Africa and Asia is also an important component of the economy in diversifying agricultural production and increasing household food security (Dolberg 2003; Sonaiya 2007; Kryger et al. 2010; Mutombo 2014). Poultry is a valuable asset to local populations, especially in disadvantaged groups and less-favoured areas of rural Africa, since it contributes significantly to food security, poverty alleviation and the promotion of gender equality (Guèye 2000).

In most economies of developing countries, the importance of poultry cannot be overstated (Adebayo and Adeola 2005) due to its role in improving the livelihoods of many smallholder farmers and great contribution to the economy of the country. Adebayo and Adeola (2005) found that in Nigeria, poultry has great importance in improving job opportunities and animal food production. A study by Okonkwo and Akubuo (2001) indicated that about 10% of the Nigerian population are engaged in poultry production, mostly on subsistence and small- or medium-sized farms. As cited by Heise et al. (2015), in Nigeria, where the production of animal protein falls far short of meeting the demands of a rapidly growing population (Obi 2003) , poultry is the most common livestock kept (Armar Klemesu and Maxwell 2000). The poultry industry has emerged as the most dynamic and fastest growing segment in the animal husbandry subsector (Heise et al. 2015).

A report presented in 2014 for World Egg Day in Nigeria indicated that the poultry subsector contributed 25% to the nation's gross domestic product annually, amounting to the single largest contributor in agriculture.[1] The same report stated that to drive the attainment of the Millennium Development Goals for agriculture and health, as well as sustainable development agenda, the production of poultry products especially chickens and eggs—which contribute about 36.5 percent of the protein intake of Nigerians—should be prioritized.

As summarized by Röling (1988), the development and transfer of appropriate technologies should be a function of the farmers' socio-economic and management practices at the field level. Thus, generating baseline data/information on the current smallholder chicken production systems, flock sizes, ecotypes kept, current productivity level and other socio-economic conditions of poor smallholder chicken farmers in sub-Saharan Africa is of paramount importance. Moreover, a better understanding of the rationale underlying smallholders' objectives for keeping chickens and use patterns of chicken and chicken products is necessary to guide research and development programs supporting village chicken producers through focusing on flock performance and traits of importance to meet smallholders' production objectives.

It is with this understanding that the ACGG project conducted a baseline survey in 2015–2016 across ACGG countries (i.e. Nigeria, Tanzania and Ethiopia) to understand, define and characterize the current smallholder chicken production system, chicken ecotypes, current productivity, husbandry practices, farmers' production objectives and the socio-economic status of poor chicken-producing smallholder farmers. Based on the baseline data, preliminary analysis was done on Nigeria baseline information and this report was developed in order to identify and analyse constraints of and opportunities for sustainable improvement of chicken production under smallholder systems in the diverse agro-ecological regions, and to identify potential areas of improvement as well as inform the design and implementation of the longitudinal survey, and eventually estimate the impact of the project.

1 https://agronigeria.com.ng/poultry-industry-responsible-25-national-gdp-pan-president

Past attempts at improvement and lessons in Nigeria

A village poultry improvement scheme aimed at upgrading the indigenous breed of chicken with improved exotic breeds Rhode Island Red (RIR), Light Sussex and Australorp was initiated in Nigeria around 1950 (Anwo 1989). The strategy was to cull all indigenous males and replace them with improved imported breeds in a 'cockerel exchange program' (Bessei 1987). This scheme failed because the crossbred chicks, though better in performance, could not survive in the semi-wild extensive backyard production system under which the indigenous chickens were raised. Another major drawback was that breed replacement resulted in a rapid loss of genetic variation (Rischkowsky et al. (eds.) 2007).

Smallholder chicken production systems in developing countries still hold opportunities to use exotic breeds for improvement of local stock as long as the candidates are evaluated under realistic management conditions resembling the reality of smallholder farming (Sørensen 2010). ACGG is also following this approach and testing the performance of tropically adapted breeds (exotic, exotic but locally improved, and locally improved chickens) for egg productivity, growth and likability by farmers.

2. Study areas, methodology and sources of the data

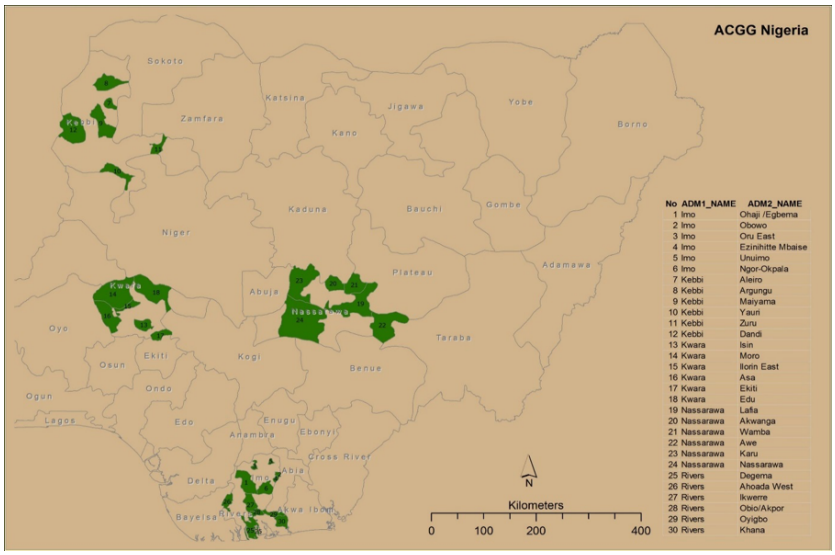
2.1 Study areas

Study site selection and sampling methods

In Nigeria, the ACGG project baseline survey was conducted in 60 rural villages of the country. The rural study villages are located in Kwara, Rivers, Imo, Nasarawa and Kebbi states which are called subnational zones representing the chicken production environments in the country (Figure 1). For this study, the selection of the subnational zones and districts was purposively based upon a high number of chickens in the sampling unit, number of smallholder households rearing chickens, per cent contribution of chicken to household income and diets, per cent of market share captured by smallholder producers, availability of feed for a growing chicken industry and finally, a diversity of agro-ecological zones.

In each subnational zone, 12 villages were selected. Thus, the total number of villages selected for the baseline study was 60. The ACGG baseline project village selection process consisted of first identifying a cluster of villages within districts. Secondly, villages were selected randomly from the long list of villages in each cluster. From the selected subnational zones and districts, a total of 1,202 chicken-keeping households with at least two years of chicken-keeping experience were randomly selected for the survey in Nigeria, and all selected households provided informed consent. However, due to response errors which may occur when respondents provide inaccurate information, and errors due to nonresponse (respondents did not provide the required information or the information they provided was unusable), 34 households which account for 2.8% of the sampled households were invalid for analysis. Therefore, the results of this study are based on the analysis of the data collected from a cross-sectional baseline survey of 1,168 households undertaken by the project in Nigeria.

Figure 1: The subnational zones and districts sampled in the ACGG baseline.



No	ADM1_NAME	ADM2_NAME
1	Imo	Ohaji /Egbema
2	Imo	Obowo
3	Imo	Oru East
4	Imo	Ezinihitte Mbaise
5	Imo	Unuimo
6	Imo	Ngor-Okpala
7	Kebbi	Aleiro
8	Kebbi	Argungu
9	Kebbi	Maiyama
10	Kebbi	Yauri
11	Kebbi	Zuru
12	Kebbi	Dandi
13	Kwara	Isin
14	Kwara	Moro
15	Kwara	Ilorin East
16	Kwara	Asa
17	Kwara	Ekiti
18	Kwara	Edu
19	Nassarawa	Lafia
20	Nassarawa	Akwanga
21	Nassarawa	Wamba
22	Nassarawa	Awe
23	Nassarawa	Karu
24	Nassarawa	Nassarawa
25	Rivers	Degema
26	Rivers	Ahoada West
27	Rivers	Ikwerre
28	Rivers	Obio/Akpor
29	Rivers	Oyigbo
30	Rivers	Khana

2.2 Data collection

The essential of any agro-sociological survey is to gather basic firsthand information with regard to farmers' circumstances and production practices. To this end, a structured questionnaire survey tool was developed, tested and implemented using the Open Data Kit (ODK) data collection tool. Prior to the commencement of the baseline survey, training was given to survey coordinators, supervisors and enumerators for each subnational zone. The seven-day training included classroom instruction, and group and field exercises. The training covered the objectives of the project and the training itself, careful examination and review of each module in the questionnaire, careful understanding of the ODK system to collect data using the tablet system, and interview techniques.

The classroom training was focused on familiarizing the survey coordinators, supervisors and enumerators with the content of the questionnaire followed by a role play training approach where one of the group members played the part of the household and was interviewed by another member of the group. Moreover, classroom training was given on how to use the tablets and ODK for the data collection, and how to load the questionnaire in the tablets followed by a role play using the tablets. In the field exercise, enumerators and supervisors were taken to nearby villages to practise interviewing, and pretesting contributed to our understanding of both the enumerators knowledge level and evaluation of the questionnaire itself. Regarding techniques of interviewing, enumerators and supervisors were taught neutrality, probing, how to approach reluctant respondents, and how to approach politely and respect the households' responses. On the last day of training, feedback was collected, the pretest was reviewed and discussed, issues in the questionnaire were identified, and any tool changes were made and finalized as required.

2.3 Data analysis

The data collected for the baseline study include but are not limited to:[2] household characteristics, chicken production, chicken inventory, chicken entries and exit, chicken marketing, chicken productivity, trait preferences, selection criteria of farm households, chicken management (chicken housing, feeding and health management), labour allocations for chicken activities, food security and consumption, and institutional and other support services. The data were analysed using STATA 14. Cross-tabulation, index and other descriptive methods of analysis were used whenever appropriate.

2 http://acgg.wikispaces.com/baseline

3. Results and discussion

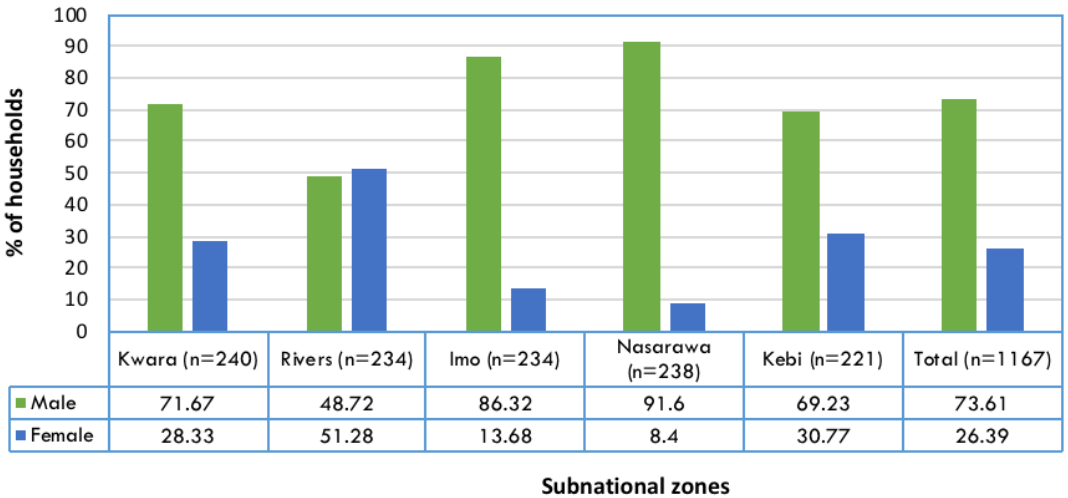
3.1 Characteristics of the household head

Gender

Gender is one of the major variables addressed in the project and used in the analysis. The distribution of household heads by gender in subnational zones is presented in Figure 2. The results of the study revealed that the majority of the household heads (91.6%) are male with Nasarawa state having the lowest number of female-headed households (8.4%) compared to Kwara, Rivers, Imo and Kebbi states. The gender distribution of household heads was similar across all the subnational zones surveyed. The proportion of female-headed households was very small, which has an implication in decision-making and chicken ownership.

The results indicated that in relative terms, the percentage of female-headed households was highest in Rivers state. For the entire sample, about 73.6% of the households covered in the baseline survey were male-headed households while only 26.4% of the households in the survey were female headed. This result indicated that the female-headed households were 47% less than the male-headed households. This result also flagged for the project potential issues of engaging women. Therefore, for the on-farm study, the householder was adopted instead of the household head, where a householder is the person who devotes most of their time to chicken production activities. In many cases, this is not the household head as the project particularly focuses on the role of women in chicken production.

Figure 2: The per cent of female- and male-headed chicken-keeping households in Nigeria (2015–16).



Source: Household baseline survey 2015–16

Respondents' education level, age and family size

Table 1 presents the basic characteristics of the sample household heads in the project subnational zones. The information includes number of years of schooling, the age of the household head in years and family size of the household head. The results of the study revealed that the average number of years of schooling of the household heads has some variation across the subnational zones. In general, household heads in Rivers, Imo and Nasarawa had attained a better education level than other subnational zones. Household heads in Kwara and Kebbi had very low education level attainment compared to the other subnational zones. For the entire sample, the average number of years of schooling was 7.8 years (Table 1).

With regard to the age of the household head, the average age in the sample households varied (Table 1). On average, household heads in Imo were older than in the other subnational zones. The average age of household heads in Imo was found to be 56.65 years. Across the subnational zones, the average age of the household heads was 54.45 years. Family size of the household was also addressed in this study. On average, family size was lowest in Kwara with an average family size of 4.0, and highest in Nasarawa with an average size of 9.0. The average household size in the entire study area was 6.5 (Table 1).

Table 1: Household basic characteristics in Nigeria (2015–16)

Subnational zones	Variables	Mean	Observation (n)
Kwara	Family size	4.0 (1.71)	215
	Age in years	56.4 (14.09)	215
	Number of years of schooling	6.59 (6.03)	215
Rivers	Family size	6.0 (2.71)	203
	Age in years	53.64 (14.34)	203
	Number of years of schooling	9.78 (4.63)	203
Imo	Family size	4.8 (2.2)	221
	Age in years	56.65 (13.6)	221
	Number of years of schooling	9.9 (4.6)	221
Nasarawa	Family size	9.0 (4.17)	231
	Age in years	50.23 (13.33)	231
	Number of years of schooling	7.73 (5.55)	231
Kebbi	Family size	8.7 (4.7)	210
	Age in years	55.58 (12.84)	210
	Number of years of schooling	5.06 (6.47)	210
Total	Family size	6.5 (3.9)	1080
	Age in years	54.45 (13.82)	1080
	Number of years of schooling	7.8 (5.8)	1080

Source: Household baseline survey 2015–16

3.2 Livelihood analysis

In this section of the report, the different components of the livelihood analysis are provided. Based on the existing institutional management, institutional setup and agro-ecological situations, households adopted strategies and behavioural choices to achieve their livelihood objectives. This section of the report primarily includes the different capital of households (physical and financial capital) across the subnational zones. Most importantly, the results focus on household income, source of livelihood and asset ownership, in particular, livestock ownership and farm and domestic asset ownership, using the household asset index specifically to determine the contribution of livestock. Moreover, based on the procedures recommended by a gender, livestock and livelihood indicators report (Njuki et al. 2011) and by adopting the Food and Agriculture Organization 2011 guidelines for measuring household and individual dietary diversity, we report the food security indicators.

Household income

Average household income from all sources, income obtained from poultry, the contribution of poultry income to the total household income and women's control of the household income are reported in Table 2. Quarterly average income of the subnational zones is also reported in Table 2. The results indicate that the average income varies across the project subnational zones. Total household income from all sources was considerably lower in Kwara and highest in Rivers. Households in Kwara and Rivers reported a mean quarterly income of NGN28,737.60 and NGN52,064.18, respectively. The average quarterly income of households from all sources was found to be about NGN34,154.30.

Income from poultry and their contribution to the household total income was analysed, since in the project areas, households that engage in poultry production activities are common. The data analysis indicates that in all subnational zones, income from poultry made an important contribution to the average household income. This contribution was more important in Imo (74.52%) than in the other subnational zones (Table 2). In all of the sample households, the contribution of poultry income to the total household income was 48.4%. Data analysis reveals that out of the total households (937), 38% of women controlled income from at least one source.

Table 2: Quarterly average household income in Nigeria (2015–16)

Income	Subnational zones					
	Kwara n=188	Rivers n=170	Imo n=143	Nasarawa n=235	Kebbi n=201	Total n=937
Poultry	3,223.54	7,997.24	5,578.03	6,632.03	3,749.13	5,416.56
	(4,158.20)	(13,735.7)	(5,917.85)	(8,092.23)	(3,408.60)	(8,051.96)
Total household income	20,513.5	52,064.18	39,090.34	33,740.5	28,737.6	34,154.3
	(50,584.51)	(144,103.27)	(129,464	(31,333.11)	(58,975.55)	(88,869.12)
Poultry/total income (%)	51.62	53.32	74.52	28.39	45.85	48.36
Women control household income (%)*	43.62	38.82	59.44	21.70	35.82	37.99

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

*This refers to the proportion of households where women control income from at least one source. This excludes joint control.

Livelihood sources

In an effort to comprehend the comparative importance of the different economic activities for contribution to the households' livelihoods, sample households were asked to identify and prioritize the three most important (primary, secondary and tertiary) sources of their livelihoods. The analysis result presented in Table 3 indicates that households in the study subnational zones derived their livelihoods from many different sources. However, for the entire sample, 36.46% and 36.73% of households declared that crop farming or production was their primary and secondary source of livelihood, respectively. For the entire sample households, 23.8% and 34.98% of the households reported that poultry keeping was their secondary and tertiary source of livelihoods, respectively. This clearly indicates that poultry production is very important in the livelihood strategies of most rural farm households in the study subnational zones and simple reliance on crop farming seems necessary but not sufficient to sustain the farming households without poultry production. The results also clearly indicate that most of the sample households have mixed farming systems, integrating crop production with livestock and poultry rearing. The main livelihood sources are categorized among the farm households' livelihood sources. Other economic activities such as livestock trading, formal salary employment, livestock herder, self-employed, working as a daily wage labourer etc. also contributed to household livelihoods but these nonfarm income sources are insignificant (Table 3).

Table 3: Household main source of livelihood in Nigeria (2015–16)

Source of livelihood	Rank of livelihood		
	Primary	Secondary	Tertiary
Crop farming	389 (36.46)	245 (36.73)	21 (9.42)
Livestock keeping	12 (1.12)	39 (5.85)	27 (12.11)
Poultry keeping	56 (5.25)	159 (23.84)	78 (34.98)
Livestock/product trading	3 (0.28)	5 (0.75)	5 (2.24)
Trading non-livestock agriculture	19 (1.78)	15 (2.25)	3 (1.35)
Salaried employment	144 (13.50)	12 (1.80)	6 (2.69)
Livestock herder	1 (0.09)	0 (0)	0 (0)
Self-employed trade	146 (13.68)	39 (5.85)	12 (5.38)
Self-employed services	164 (15.37)	50 (7.50)	6 (2.69)
Farm labourer	3 (0.28)	2 (0.30)	3 (1.35)
Fishing	6 (0.56)	8 (1.20)	6 (2.69)
Old/retired	107 (10.03)	21 (3.15)	5 (2.24)
Domestic work-own	2 (0.19)	61 (9.15)	43 (19.28)
Unemployed	7 (0.66)	6 (0.90)	6 (2.69)
Infant/child<6years	2 (0.19)	1 (0.15)	1 (0.45)
Student/pupil	1 (0.09)	3 (0.45)	1 (0.45)
Disabled	5 (0.47)	1 (0.15)	223 (100.00)
Total	1,067 (100.00)	667 (100.00)	223 (100.00)

Source: Household baseline survey 2015–16

Note: Percentages in parentheses

Asset ownership

Livestock holdings

In the study subnational zones, as indicated above in Table 3, livestock contributes significantly to the livelihoods of households and is considered a productive asset for the households which provides meat, milk, eggs and traction as well as cash income through sales. Moreover, livestock is a source of self-reliance against income shocks. As indicated in Table 4, livestock resources include cattle, goats, sheep, donkeys, camels, horses, guinea fowl, rabbits and chicken. Based on a procedure recommended by a gender, livestock and livelihood indicators report (Njuki et al. 2011), the herd size was converted into tropical livestock unit (TLU). The results of the analysis reveal that most of the households in all subnational zones own some livestock, but average holdings are small (Table 4). For the entire sample, on average ownership is dominated by chicken which contributed 0.28 TLUs, followed by goats with 0.23 TLUs (Table 4). However, the average livestock ownership varies considerably across the project subnational zones.

Table 4: Livestock asset ownership in TLU in Nigeria (2015–16)

Livestock species	Subnational zones					
	Kwara n=240	Rivers n=234	Imo n=234	Nasarawa n=238	Kebbi n=222	Total N=1,168
Cattle	0.02	0.02	0.00	0.10	0.50	0.12
	(0.32)	(0.21)	(0.00)	(0.64)	(1.87)	(0.90)
Sheep	0.03	0.01	0.01	0.06	0.20	0.06
	(0.12)	(0.09)	(0.09)	(0.25)	(0.27)	(0.19)
Goats	0.35	0.13	0.15	0.19	0.34	0.23
	(0.46)	(0.29)	(0.25)	(0.28)	(0.37)	(0.35)
Chicken	0.29	0.30	0.25	0.28	0.28	0.28
	(0.20)	(0.21)	(0.19)	(0.12)	(0.20)	(0.19)
Donkeys	0.00	0.00	0.00	0.00	0.04	0.01
	(0.00)	(0.00)	(0.00)	(0.03)	(0.15)	(0.07)
Ducks	0.00	0.01	0.00	0.04	0.02	0.01
	(0.01)	(0.06)	(0.02)	(0.12)	(0.09)	(0.08)
Guinea fowls	0.00	0.00	0.00	0.00	0.02	0.00
	(0.00)	(0.00)	(0.00)	(0.01)	(0.05)	(0.02)
Rabbits	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

Gender disaggregated ownership of livestock is one of the variables addressed in the baseline survey (Table 5). The results of the data indicate that across the subnational zones, livestock ownership is dependent upon the type of livestock owned. Goats, ducks and guinea fowl are predominantly owned by women whereas cattle, sheep and donkey are predominantly owned by men.

Table 5: Ownership of livestock by gender disaggregated in Nigeria (2015–16)

Livestock species	Subnational zones					
	Kwara n=240	Rivers n=234	Imo n=234	Nasarawa n=238	Kebbi n=222	Total n=1,168
Goats men	1.22	0.45	0.53	1.03	0.79	0.81
	(2.89)	(1.50)	(1.53)	(2.07)	(1.95)	(2.08)
Goats women	1.82	0.52	0.37	0.42	2.39	1.09
	(2.76)	(1.69)	(1.42)	(1.07)	(2.98)	(2.27)
Goats jointly	0.41	0.32	0.64	0.43	0.20	0.40
	(1.54)	(1.81)	(1.84)	(1.93)	(1.15)	(1.69)
Goats household	3.45	1.29	1.54	1.87	3.38	2.30
	(4.63)	(2.92)	(2.50)	(2.84)	(3.65)	(3.51)
Cattle men	0.01	0.01	0.00	0.18	0.78	0.19
	(0.14)	(0.20)	(0.00)	(1.23)	(3.64)	(1.71)
Cattle women	0.03	0.00	0.00	0.00	0.17	0.04
	(0.52)	(0.07)	(0.00)	(0.06)	(0.71)	(0.39)
Cattle jointly	0.00	0.02	0.00	0.02	0.05	0.02
	(0.00)	(0.33)	(0.00)	(0.32)	(0.47)	(0.29)
Cattle household	0.05	0.04	0.00	0.20	1.00	0.25
	(0.65)	(0.42)	(0.00)	(1.29)	(3.74)	(1.80)
Sheep men	0.13	0.03	0.04	0.43	0.80	0.28
	(0.91)	(0.33)	(0.40)	(2.05)	(1.93)	(1.37)

Livestock species	Subnational zones					
	Kwara n=240	Rivers n=234	Imo n=234	Nasarawa n=238	Kebbi n=222	Total n=1,168
Sheep women	0.08	0.05	0.00	0.13	0.96	0.24
	(0.57)	(0.51)	(0.00)	(1.10)	(1.70)	(1.02)
Sheep jointly	0.04	0.00	0.09	0.08	0.19	0.08
	(0.40)	(0.07)	(0.86)	(0.91)	(1.15)	(0.78)
Sheep household	0.26	0.08	0.13	0.65	1.95	0.60
	(1.17)	(0.88)	(0.95)	(2.50)	(2.71)	(1.94)
Donkeys men	0.00	0.00	0.00	0.00	0.08	0.02
	(0.00)	(0.00)	(0.00)	(0.06)	(0.30)	(0.14)
Donkeys women	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Donkeys jointly	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.07)	(0.03)
Donkeys household	0.00	0.00	0.00	0.00	0.08	0.02
	(0.00)	(0.00)	(0.00)	(0.06)	(0.30)	(0.14)
Chicken[4] household	29.36	29.52	24.68	28.10	27.98	27.93
	(19.88)	(21.42)	(18.82)	(12.50)	(20.05)	(18.82)
Ducks men	0.02	0.20	0.07	0.77	0.11	0.24
	(0.18)	(1.47)	(0.52)	(3.00)	(0.73)	(1.58)
Ducks women	0.00	0.10	0.02	0.47	0.31	0.18
	(0.00)	(1.33)	(0.26)	(2.27)	(1.77)	(1.43)
Ducks jointly	0.03	0.05	0.04	0.08	0.19	0.07
	(0.39)	(0.44)	(0.59)	(0.63)	(2.39)	(1.14)
Ducks household	0.04	0.35	0.12	1.32	0.61	0.49
	(0.43)	(2.11)	(0.82)	(3.99)	(3.05)	(2.51)
Rabbits men	0.00	0.00	0.00	0.00	0.04	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.49)	(0.21)
Rabbits women	0.00	0.00	0.00	0.00	0.01	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.13)	(0.06)
Rabbits jointly	0.01	0.00	0.00	0.00	0.00	0.00
	(0.13)	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)
Rabbits household	0.01	0.00	0.00	0.00	0.05	0.01
	(0.13)	(0.00)	(0.00)	(0.00)	(0.54)	(0.24)
Guinea fowl men	0.00	0.00	0.00	0.03	0.30	0.06
	(0.00)	(0.00)	(0.00)	(0.52)	(2.42)	(1.08)
Guinea fowl women	0.00	0.00	0.00	0.00	0.98	0.19
	(0.00)	(0.00)	(0.00)	(0.00)	(3.33)	(1.50)
Guinea fowl jointly	0.00	0.00	0.00	0.00	0.26	0.05
	(0.00)	(0.00)	(0.00)	(0.00)	(2.40)	(1.05)
Guinea fowl household	0.00	0.00	0.00	0.03	1.54	0.30
	(0.00)	(0.00)	(0.00)	(0.52)	(4.86)	(2.21)

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

4 Because of lack of gender disaggregated data, the chicken data is presented only at household level.

Farm and household domestic asset ownership

Based on the procedure recommended for all BMGF-funded projects 2010–11, farm and household domestic asset indices were first computed and then asset ownership in terms of the assets index was compared across the three types of household ownership (male, female and joint). The overall results (Table 6) indicate that compared to women, men owned more farm and household assets. Farm implements, transport and domestic assets are predominantly owned by men. However, joint ownership was also common for some of these productive assets.

The contribution of livestock to the household base was also analysed. The results (Table 6) indicate that the contribution of livestock to the household asset index varies across subnational zones, ranging from 2.45% in Imo to up to 17.28% in Kebbi. For the entire sample, on average livestock contribution to the household asset index was found to be 6.69%.

Table 6: Household and domestic assets ownership index in Nigeria (2015–16)

Asset ownership	Subnational zones					
	Kwara n=240	Rivers n=234	Imo n=234	Nasarawa n=238	Kebbi n=222	Total N=1,168
Land male	1.59	5.89	1.41	0.66	4.09	2.70
	(4.60)	(80.78)	(3.64)	(7.47)	(8.26)	(36.58)
Land female	0.12	163.46	0.15	0.02	1.42	33.08
	(0.55)	(1393.78)	(1.64)	(0.10)	(7.17)	(626.20)
Land jointly	0.04	52.78	0.24	0.02	0.15	10.66
	(0.52)	(807.34)	(1.43)	(0.19)	(1.16)	(361.36)
Farm implements male	28.28	14.01	20.83	35.90	23.49	24.57
	(53.77)	(18.97)	(34.00)	(46.03)	(37.11)	(40.50)
Farm implements female	4.50	13.83	11.19	4.69	2.17	7.31
	(13.25)	(17.14)	(14.33)	(14.07)	(7.24)	(14.33)
Farm implements jointly	1.39	3.98	22.15	15.34	1.96	9.02
	(8.24)	(13.25)	(34.65)	(30.96)	(10.48)	(23.95)
Transport male	194.97	103.70	214.82	191.18	106.34	163.04
	(496.39)	(262.41)	(460.50)	(296.58)	(273.51)	(375.24)
Transport female	20.87	24.37	41.57	90.82	0.00	36.00
	(291.04)	(120.90)	(151.21)	(1125.26)	(0.00)	(531.90)
Transport jointly	2.67	3.08	19.41	16.26	0.22	8.41
	(41.31)	(41.99)	(114.02)	(121.28)	(3.22)	(79.68)
Domestic male	61.52	45.50	56.69	58.65	25.05	49.83
	(79.14)	(52.55)	(77.00)	(88.44)	(35.61)	(70.86)
Domestic female	39.75	31.93	26.06	34.59	18.47	30.35
	(53.15)	(35.77)	(30.30)	(49.49)	(30.84)	(41.81)
Domestic jointly	5.86	10.48	24.67	14.99	6.79	12.59
	(21.72)	(25.11)	(37.88)	(38.77)	(19.09)	(30.50)
Household asset index	400.80	285.51	467.71	502.20	241.63	381.52
	(714.20)	(350.23)	(611.21)	(1396.92)	(359.45)	(796.50)
Livestock contribution to household asset index (%)	7.47	2.95	2.45	3.88	17.28	6.69

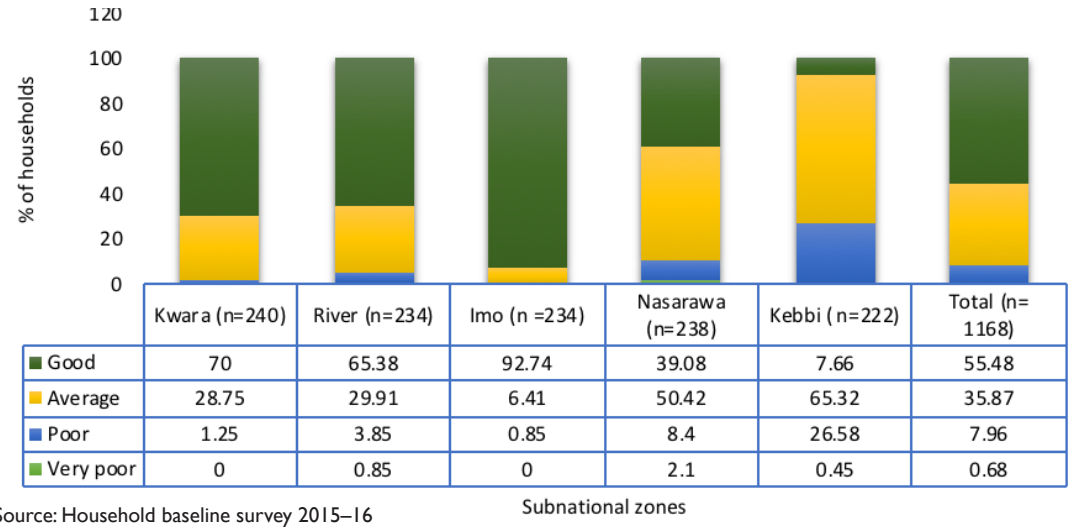
Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

Quality of housing

Based on the procedure recommended by a gender, livestock and livelihood indicators report (Njuki et al. 2011), the Cashpor Housing Index (CHI) was used to classify the quality of the housing conditions of the households. CHI uses the external housing conditions such as number of rooms, floor, wall and roofing material as a proxy for poverty condition of a household. The idea behind CHI is based on the principle that poor households spend their income on basic household necessities and social commitments rather than investing in their houses. Thus, based on CHI, the quality of a house in the sample households is classified as very poor, poor, average and good quality (Figure 3). The results of the analysis indicate that the majority of households in Kwara (70%), Rivers (65.38%) and Imo (92.74%) were living in good quality housing, whereas the majority of households in Kebbi (65.32%) and half of the respondents in Nasarawa (50.42%) were living in an average quality house (Figure 3). The overall results of the sample households indicate that 55.48%, 35.87%, 7.96% and 0.68% of the households were living in good, average, poor and very poor housing conditions, respectively (Figure 3).

Figure 3: Farmers' housing conditions in Nigeria (2015–16).



	Kwara (n=240)	River (n=234)	Imo (n =234)	Nasarawa (n=238)	Kebbi (n=222)	Total (n= 1168)
Good	70	65.38	92.74	39.08	7.66	55.48
Average	28.75	29.91	6.41	50.42	65.32	35.87
Poor	1.25	3.85	0.85	8.4	26.58	7.96
Very poor	0	0.85	0	2.1	0.45	0.68

Source: Household baseline survey 2015–16

3.3 Food security

Poultry are maintained in the study subnational zones and considered a productive asset for the household and an important contributor to food security. Poultry provide meat and eggs which increase the households' consumption of animal-sourced food. Moreover, the contribution of poultry to food security is related to income from sale of poultry and poultry products. This income is often used for the purchase of additional food items necessary for the household. The next subsection of the report focuses on availability, access and consumption aspects of food security dimensions.

Adequate food provisioning in the last 12 months

Household food access is defined as the ability of a household to obtain adequate food in terms of both quality and quantity from their own produce, purchase or exchange, or receive as a gift to meet the family members' nutritional requirements. The Months of Adequate Household Food Provisioning was used as a proxy measure for food access.

The results of the data on the proportion of food adequate for households and average months of food adequacy are presented in Table 7. The food adequacy in terms of proportion of food for households indicate that thereare some marked variations across the subnational zones. Out of the total sample households, 94.98%, 89.4%, 85.28%, 40.25% and 59.33% of the respondents in Kwara, Rivers, Imo, Nasarawa and Kebbi, respectively, reported that they had enough food in the last 12 months (Table 7). The overall sample results indicate that 74% of the sample respondents reported that they had adequate food in the last 12 months for their household.

Table 7: Adequate food provisioning in the last 12 months in Nigeria (2015–16)

Characteristics	Subnational zones					
	Kwara n=239	Rivers n=226	Imo n=231	Nasarawa n=236	Kebbi n=209	Total n=1,141
Proportion of food adequate for households (%)	94.98	89.4	85.28	40.25	59.33	74.06
Average months of adequate food	11.40 (2.63)	10.73 (3.71)	10.23 (4.26)	4.83 (5.90)	7.12 (5.91)	8.89 (5.26)

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

Household dietary diversity score

The household dietary diversity score (HDDS) is commonly used as one main dimension of a quality diet. It refers to counting the number of food groups consumed within and across the different groups rather than the number of different foods consumed during a 24-hour recall period divided by the total number of households. The HDDS can also be adapted and used as an IDDS, which is used as a proxy measure of the nutritional quality of an individual's diet. The concept is that increasing food varieties and different food groups in the diet are beneficial as it ensures adequate intake of essential nutrients and helps better health. The HDDS is also used as a proxy measure of the socio-economic status of a household.

To assess the HDDS, an adult male (usually the head of household if present), adult female (usually the spouse or head of household if present) and an index child (less than 5 years) were interviewed and asked to recall what meals they had consumed over the last 24 hours. It covers a total of 12 food groups: cereals, roots and tubers, vegetables, fruits, meat, eggs, fish, pulses/legumes/nuts, milk and milk products, oils and fats, sugar/honey/sweets, and spices, condiments and beverages.

Table 8: Dietary diversity score in Nigeria (2015–16)

Individual household members	Subnational zones					
	Kwara	Rivers	Imo	Nasarawa	Kebbi	Total
Children	9.03	8.48	9.44	5.68	4.62	6.41
	(3.59)	(2.62)	(1.82)	(1.98)	(2.55)	(3.03)
	n=36	n=33	n=43	n=132	n=110	N=354
Women	6.43	6.67	8.07	5.84	4.56	6.28
	(3.00)	(2.01)	(2.26)	(1.86)	(2.45)	(2.61)
	n=214	n=198	n=199	n=219	n=214	n=1,044
Men	5.88	6.42	7.95	5.88	5.01	6.22
	(2.87)	(1.91)	(1.98)	(1.81)	(2.62)	(2.47)
	n=154	n=114	n=175	n=201	n=167	n=811

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

The results of the data presented in Table 8 indicate that at the subnational zones level, the IDDS was higher in Imo for index children, women and men with an average score of 9.44, 8.07 and 7.95, respectively. The IDDS were lowest in Kebbi with an average score of 4.62 for children, 4.56 for women and 5.01 for men. Across the subnational zones, the IDDS was found to be higher for index children (6.41) than for women and men.

Food consumption score

The FCS is the frequency of consumption of nine food groups over a seven-day recall period weighted by nutritional value of the food group. The food groups considered are staples: vegetables, fruits, pulses, meat and fish, milk, oil, sugar and condiments. In computing FCS, foods that are usually nutrient rich get more weight than low nutrient foods. An FCS of 0–21 is considered poor, 21.5–35 is considered borderline while an FCS greater than 35 is considered acceptable.

Generally, the results presented in Table 9 indicate that for all household categories (children, women and men) the highest FCS was reported in Imo and the lowest in Kebbi. The highest average FCS was reported for children in Imo (88.05) while the lowest FCS was reported for women in Kebbi (52.02). However, across the subnational zones, the FCS for children, women and men were all above 35 and therefore considered acceptable.

Table 9: FCS in Nigeria (2015–16)

Household members	Subnational zones					
	Kwara	Rivers	Imo	Nasarawa	Kebbi	Total
Children	69.04	77.77	88.05	58.00	54.15	63.44
	(12.37)	(25.04)	(13.60)	(19.27)	(22.12)	(22.75)
	n=36	n=33	n=43	n=131	n=110	n=353
Women	69.88	66.76	80.64	58.72	52.02	65.35
	(13.14)	(14.65)	(14.60)	(17.63)	(21.70)	(19.30)
	n=214	n=198	n=200	n=219	n=214	n=1,045
Men	70.17	65.90	80.84	59.80	53.97	65.99
	(13.38)	(15.78)	(13.28)	(17.03)	(21.79)	(19.12)
	n=154	n=114	n=176	n=201	n=167	n=812

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

Consumption of chicken and chicken products

Table 10 presents the general overview of households' consumption of chicken (live birds) and eggs in the last three months in the study subnational zones. Consumption of both live birds and eggs was interpreted using the mean number of birds and eggs consumed either from home production or purchased from other sources. The results of the data indicate that live bird consumption was highest in Rivers and lowest in Kwara subnational zones. On average, households in Rivers consumed 4.18 birds while in Kwara the number was 3.26. Kebbi is the second highest subnational zone in bird consumption; on average, households in Kebbi consumed 3.98 birds. Across the subnational zones, households consumed on average 3.85 live birds.

Table 10: Chicken and egg consumption (numbers consumed in the last three months) in Nigeria (2015–16)

Poultry and poultry products	Subnational zones					
	Kwara n=168	Rivers n=211	Imo n=183	Nasarawa n=214	Kebbi n=200	Total n=976
Birds produced	3.13 (3.21)	2.93 (3.95)	2.39 (2.17)	3.45 (3.02)	3.52 (2.72)	3.10 (3.11)
Birds purchased	0.13 (0.71)	1.25 (3.49)	1.38 (2.22)	0.48 (2.40)	0.46 (1.38)	0.75 (2.35)
Total birds consumed	3.26 (3.49)	4.18 (5.86)	3.77 (3.52)	3.93 (3.86)	3.98 (2.61)	3.85 (4.07)
Eggs produced	2.67 (5.92)	5.48 (9.27)	6.75 (13.42)	3.92 (6.46)	3.29 (7.25)	4.44 (8.95)
Eggs purchased	12.92 (60.67)	11.21 (16.75)	25.40 (44.48)	3.71 (7.17)	1.29 (4.61)	10.49 (33.85)
Total eggs consumed	15.60 (62.76)	16.69 (18.80)	32.15 (46.37)	7.64 (9.22)	4.58 (8.29)	14.93 (35.70)

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

The data on egg consumption are also reported in Table 10. The results show that there is a wide variation in consumption of eggs between subnational zones. Egg consumption was high in Imo (32 eggs) and low in Kebbi (4.5 eggs) and Nasarawa

(7.64) subnational zones. Across the subnational zones, the average egg consumption was 15 eggs. The data indicate that the small average number of eggs consumed is a result of households selling live birds to meet their immediate cash needs.

Chicken production, purpose and objectives of keeping chicken

Poultry-keeping practices

In this study, we explored the duration of chicken keeping in the households in order to assess smallholder chicken-keeping practices. Poultry-keeping experience is an important parameter to classify and target smallholder households for the on-farm experimental intervention in the project. This is because at least two years of chicken-keeping experience is required to be an on-farm study participant household in the project. As indicated in Table 11, the results reveal that the mean duration (years) of chicken keeping was highest in Imo at 19.82 years and lowest in Rivers at 10.97 years. This indicates that the duration of poultry keeping is not uniform across the subnational zones. Across the sampled households, the mean duration of chicken keeping is 16.20 years. This information helps the project to understand the target households in terms of knowledge level for targeting of training. The study also reveals that the majority of households, 1,155 (98.88%), kept poultry for at least two years.

Table 11: Mean duration of chicken-keeping experience by households in years in Nigeria (2015–2016)

Subnational zones	Observations (n)	Mean	Max
Kwara	240	18.47 (12.14)	55
Rivers	234	10.97 (9.41)	55
Imo	234	19.82 (15.63)	80
Nasarawa	238	13.61 (8.60)	62
Kebbi	222	18.22 (11.17)	50
Total mean	1168	16.20 (12.11)	80

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

Flock size per household

The study also examined the average flock size per household (Table 12). The average number of chickens in all the sampled subnational zones is approximately 28 chickens per household. Of all the sampled households that kept chickens, about 60.19% kept less than 30 chickens; 40.58% of the households kept less than 20 chickens. The multiple response analysis also indicated that, in terms of breeds, an overwhelming majority (88%) of the sample households kept the local breeds of chicken while 12% of the sample households kept other chicken breeds.

Table 12: Flock size per household in the different subnational zones in Nigeria (2015–16)

Subnational zones	Observations (n)	Average number of adult chicken per households
Kwara	240	29.35 (19.87)*
Rivers	234	29.47 (21.40)*
Imo	234	24.67 (18.82)*
Nasarawa	238	28.10 (12.49)*
Kebbi	222	27.94 (19.72)*
Total mean	1168	27.91 (18.74)

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

Note: * indicates statistical significance (p=.05).

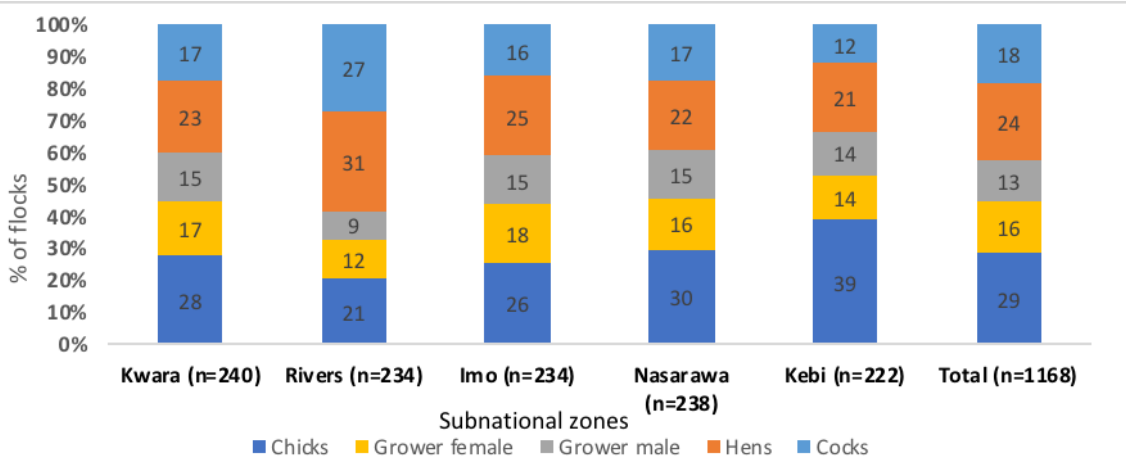
The results indicate that the average flock size differs between the subnational zones. The highest flock size per household was reported in Rivers (29.47), whereas flock size per household was lowest in Imo (24.67). The higher flock size in Rivers could be a

result of greater awareness by the farmers about chicken production. Another possible explanation for higher flock size could be the availability of well-organized poultry facilities including market and hatchery compared with other subnational zones.

Flock composition per household

The structure and composition of flocks in the study households are dominated by chicks followed by hens which is in agreement with the literature that indicates a typical flock structure consists of chicks, pullets (grower male and female), cocks and hens (Hailemichael et al. 2016). As presented in Figure 4, the flocks are composed of a greater number of adult chickens (71%) than chicks (29%). Over all, out of the total flocks counted, chicks constitute the largest share (29%) of the flocks. This reflects the reality on the ground that this age group predominates as the largest percentage of flock composition in village poultry. Nevertheless, about 25.60% of households did not have a chick in their flock. Hens account for 24% of the total flocks. Moreover, the results reveal that out of the total flocks, young chicks (grower male and females) account for approximately 30% of the total flocks. In this study, information on the sex ratio of flocks was analysed and the results indicate that the ratio of cocks to hens is (1:1.3). Almost 40% of the flocks were constituted of female chickens (hens and grower females), which probably implies that farmers need to preserve or save females for breeding.

Figure 4: Chicken flock composition per households in different subnational zones in Nigeria (2015–16).



Source: Household baseline survey 2015–16

Table 13 presents the rank indices of the purpose and objectives of keeping chickens by the sample households in the different subnational zones.

Reasons for keeping chickens

Table 13: Ranking of chicken production objectives and purposes by households in Nigeria (2015–16)

Production objectives	Rank index of chicken production purpose and objectives				
	Kwara	Rivers	Imo	Nasarawa	Kebbi
Meat consumption	0.45	0.44	0.46	0.36	0.35
Egg consumption	0.05	0.04	0.06	0.01	0.08
Meat sale	0.11	0.04	0.02	0.02	0.02
Egg sale	0.01	0.02	0.01	0.00	0.01
Chick sale	0.04	0.02	0.00	0.01	0.00
Ceremonies/festivals	0.06	0.11	0.06	0.18	0.28
Give away	0.09	0.05	0.02	0.08	0.05
Cock fighting	0.01	0.00	0.00	0.00	0.00
Live adult chicken sale	0.20	0.28	0.37	0.33	0.20

Source: Household baseline survey 2015–16

Note: Index = [(3 × number of households ranking as first + 2 × number of households ranking as second + 1 × number of households ranking as third) for each objective]/[(3 × total number of households ranking any purpose first + 2 × total number of households ranking any purpose as second + 1 × total number of households ranking any purpose as third)].

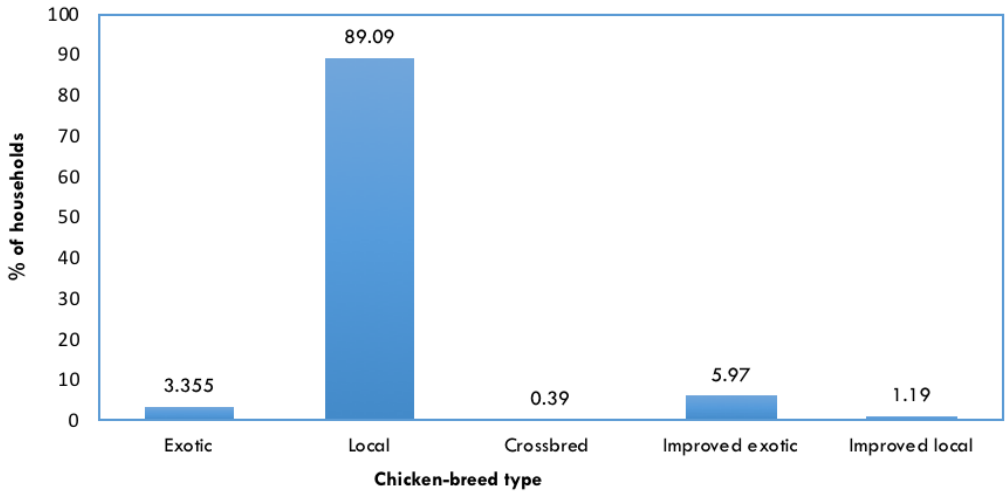
The results of this study indicate that many of the sampled rural households keep chickens for multiple purposes and objectives. Meat consumption and sale of live adult chicken constitute the primary purpose and objectives for keeping chickens in Kwara, Rivers, Imo and Nasarawa subnational areas with their respective indices of (0.45) and (0.20) in Kwara, (0.44) and (0.28) in Rivers, (0.46) and 0.37) in Imo and (0.36) and (0.33) in Nasarawa, while meat consumption and ceremonies/festivals were the primary purpose and objectives for keeping chickens in Kebbi with rank indices of (0.35) and (0.28), respectively. Meat consumption was the main purpose and objective of keeping chickens across all subnational zones which implies the need for meat-type chicken breeds. Generally, the results indicate that farmers' identified objectives have relatively tangible benefits such as source of income and consumption which coincides with market demand. Other purpose and objectives of keeping chickens are meat sale, egg sale and others. However, the results imply that consumption of chicken meat and sale of live adult chickens are common reasons for chicken keeping by the majority of households, rather than egg sale and consumption. Almost none of the respondents mentioned keeping chickens for cock fighting which indicates that it is not a common cultural practice in Nigeria. Meat sale, give away and ceremonies/festivals received relatively low rankings for keeping chickens in most of the subnational zones.

Farmers chicken-breed preference

In this study, we explored households' preference for different breed types of chicken even if households do not keep all breed types. The multiple-response analysis results showed that the majority of the households (89.09%) preferred the local chicken breeds over the other chicken-breed types (Figure 5).

The exotic and improved exotic breeds, which are considered more productive, were ranked the second and third most preferred breeds over other breeds, respectively (Figure 5). However, further study will be necessary at all ACGG sites in order to ascertain the reasons for farmers' decreased preference for the exotic and improved ecotypes. One of the study limitations recognized during the enumerators' and supervisors' baseline data collection training was the difficulty identifying chicken breeds on the ground. This challenge was also observed among smallholder farmers.

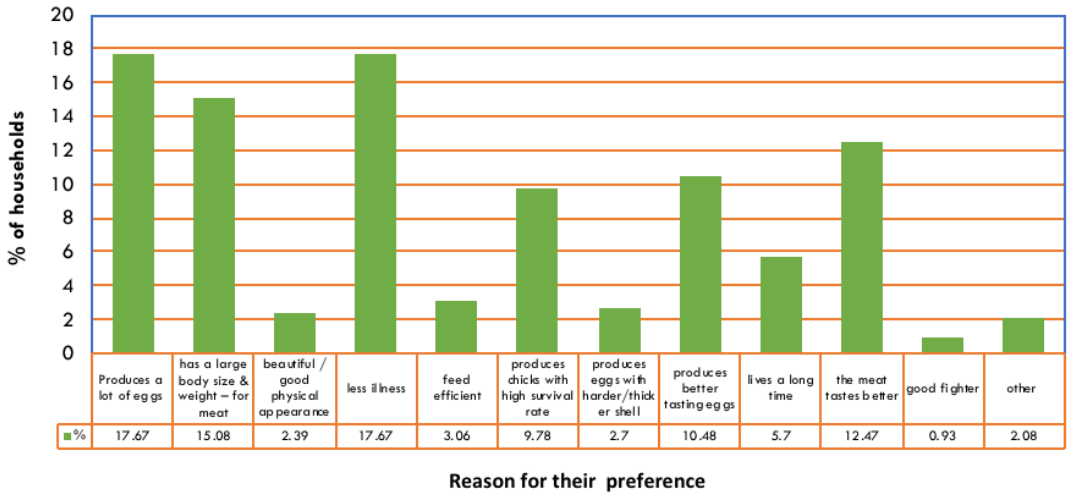
Figure 5: Chicken-breed preference by farmers in Nigeria (2015–16).



Source: Household baseline survey 2015–16

The reasons given for local chicken-breed preference include less illness (17.67%), better meat taste (12.47%), more eggs (17.67%) and longevity (5.7%) (Table 14).

Table 14: Households reasons for breed preference in in Nigeria (2015–16)



Trait preferences

The rank index of traits preference when selecting cockerels and hens as perceived by farmers irrespective of whether they select specific chickens for breeding purpose was analysed and is presented in Table 15. The results reveal that for good cockerels, the most important traits are large body size and weight, better meat taste, less illness and good physical appearance. Traits such as lives a long time, feed efficient and good fighter were not highly ranked, though farmers considered them important. Similarly, production of more eggs, production of chicks with high survival rate and less illness are the most important traits for good hens. Farmers also considered better meat taste and eggs important traits.

Table 15: Attributes/qualities of good cockerels and hens in Nigeria (2015–16)

Qualities/ attributes of a good chicken		Rank index of qualities/attributes of a good chicken									
		Cockerels					Hens				
	Kwara	Rivers	Imo	Nasarawa	Kebbi	Kwara	Rivers	Imo	Nasarawa	Kebbi
Large body size and weight	0.29	0.08	0.29	0.26	0.32	0.02	0.02	0.03	0.09	0.06
Less illness	0.20	0.15	0.17	0.14	0.15	0.05	0.09	0.18	0.12	0.12
Meat tastes better	0.16	0.37	0.23	0.18	0.16	0.05	0.16	0.07	0.07	0.05
Good physical appearance	0.07	0.11	0.09	0.10	0.21	0.06	0.04	0.02	0.06	0.04
Lives a long time	0.12	0.14	0.10	0.10	0.08	0.05	0.06	0.06	0.04	0.06
Good fighter	0.06	0.04	0.03	0.07	0.01	0.01	0.00	0.06	0.01	0.02
Feed efficient	0.08	0.10	0.04	0.13	0.06	0.02	0.04	0.03	0.08	0.01
Produces a lot of eggs	0.01	0.01	0.00	0.00	0.01	0.45	0.30	0.24	0.29	0.40
Produces better-tasting eggs	0.01	0.01	0.01	0.00	0.00	0.04	0.08	0.02	0.02	0.06
Produces eggs with harder/ thicker shell	0.01	0.00	0.00	0.01	0.00	0.08	0.01	0.01	0.05	0.02
Produces chicks with high survival rate		0.01	0.03	0.00	0.00	0.17	0.20	0.29	0.18	0.15

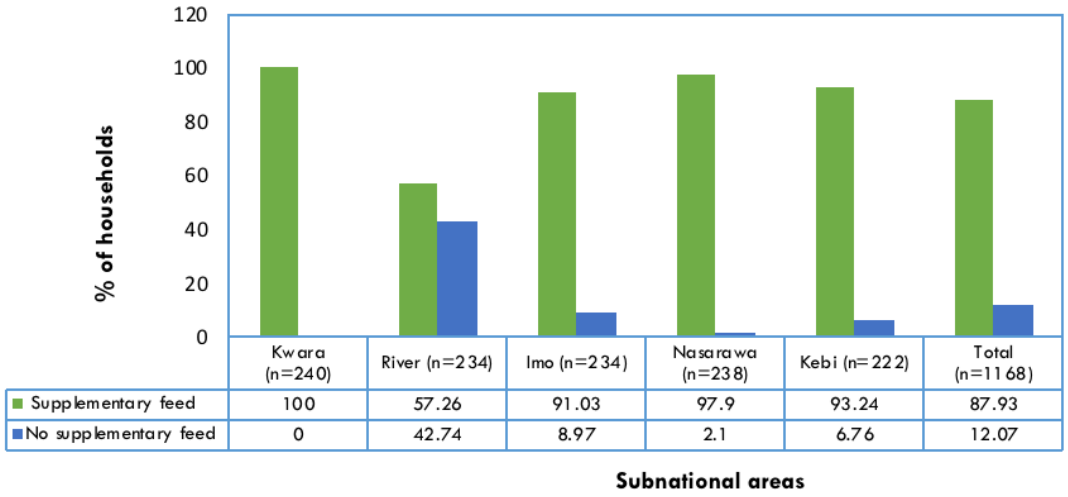
Source: Household baseline survey 2015–16

Note: Index = [(3 × number of households ranking as first + 2 × number of households ranking as second + 1 × number of households ranking as third) for each objective]/[(3 × total number of households ranking any purpose first + 2 × total number of households ranking any purpose as second + 1 × total Number of households ranking any purpose as third)].

Existing practice of supplementary feed

Supplementary feed is a major limiting factor in village chicken production. As indicated in Figure 6, the majority of households (87.93%) have had experience of providing supplementary feeding to their chickens at any time of the year. Supplementary feed in this study is defined as 'any feed not obtained from scavenging'. The result also indicated that the majority of the households in all subnational zones have sufficient experience of giving supplementary feed for their chickens. This implies that households understand the importance of supplementation to enhance production and productivity. The results also support the households' need to supplement the on-farm strains allocated because of the high percentage of households supplementing. This reflects the influence of baseline information on the implementation of the on-farm component of the project. However, it is necessary to monitor the frequency of supplementation, and the pressure on the households in terms of the need to supplement because of the additional numbers and higher-consuming breeds.

Figure 6: Existing practice of provision of supplementary feed for chickens in Nigeria (2015–16).



	Kwara (n=240)	River (n=234)	Imo (n=234)	Nasarawa (n=238)	Kebi (n=222)	Total (n=1168)
Supplementary feed	100	57.26	91.03	97.9	93.24	87.93
No supplementary feed	0	42.74	8.97	2.1	6.76	12.07

Source: Household baseline survey 2015–16

3.4 Poultry labour allocations

Labour allocation for chicken

The average time spent in minutes for the different chicken activities by the various household members is presented in Table 16. The results of the data indicate that all members of the household have spent time on chicken activities. However, the time spent by the various household members varies across the subnational zones. The overall results indicate that the average time spent was higher for adult female members of the household than for the rest of the household members. On average, adult women spent 94.26 minutes in a week for chicken activities. Next to women, men spent more time than children and hired labour. On average, adult males spent 46.20 minutes per week on chicken activities. The results imply that caring for chickens and chicken management is the responsibility of women more than other members of the household. Even though the time spent by adult males is less compared with women, adult males in the household play a considerable role in chicken management.

Table 16: Chicken labour allocation (minutes in the last one week) in Nigeria (2015–16)

Household members	Subnational zones					
	Kwara n=240	Imo n=234	Rivers n=234	Nasarawa n=238	Kebbi n=222	Total N=1,168
Adult males	63.92	34.07	83.15	32.76	15.31	46.20
	(101.99)	(79.01)	(243.65)	(65.64)	(51.80)	(131.14)
Adult females	130.35	99.51	132.13	52.39	54.68	94.26
	(178.02)	(108.68)	(267.94)	(61.16)	(53.18)	(160.29)
Children	13.22	13.83	11.93	11.94	8.85	11.99
	(69.86)	(42.78)	(37.58)	(34.27)	(36.38)	(46.25)
Hired males	0.00	0.71	3.01	2.71	0.00	1.30
	(0.00)	(9.85)	(21.07)	(40.84)	(0.00)	(21.18)
Hired females	0.00	1.05	0.00	0.00	0.00	0.21
	(0.00)	(7.15)	(0.00)	(0.00)	(0.00)	(3.22)

Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

Labour allocation in poultry production per activity

In addition to chicken labour allocation, the average time spent in minutes for the different poultry production activities by the different household members is shown in Table 17. The results indicate that except for purchasing input in which the adult males spent more minutes per week than other household members, in all other poultry production activities including feeding chickens, watering chickens, cleaning shelter, manure collection, egg collection, selling of birds and disease control, the adult females in the household spent more minutes per week than other members of the household. The results imply that most of the activities in rearing chickens and other poultry are done by household females.

Table 17: Labour allocation in poultry production (minutes/week) by activity in Nigeria (2015–16)

Household members	Poultry-production activities							
	Purchasing inputs n=2	Feeding n=961	Watering n=925	Cleaning shed/shelter n=844	Manure collection n=49	Egg collection n=24	Selling birds n=13	Disease control n=16
Adult males	42.41	20.13	16.85	19.24	14.45	10.42	8.54	11.31
	(80.44)	(51.9)	(77.34)	(55.43)	(41.15)	(18.17)	(17)	(19.4)
Adult females	24.86	38.89	28.42	51.68	15.37	20.63	19.5	13.50
	(78.27)	(79.2)	(49.90)	(83.94)	(24.27)	(39.68)	(35)	(18.0)
Children	0.00	4.58	3.60	6.93	7.41	2.92	0.00	0.00
	(0.00)	(20.2)	(16.16)	(26.26)	(16.19)	(8.98)	(0.0)	(0.00)
Hired males	0.00	0.79	0.31	0.28	4.90	0.00	0.00	0.00
	(0.00)	(14.7)	(7.06)	(3.95)	(34.29)	(0.00)	(0.0)	(0.00)
Hired females	0.00	0.07	0.01	0.20	0.00	0.00	0.00	0.00
	(0.00)	(1.52)	(0.33)	(3.27)	(0.00)	(0.00)	(0.00)	(0.00)

Source: Household baseline survey 2015–16

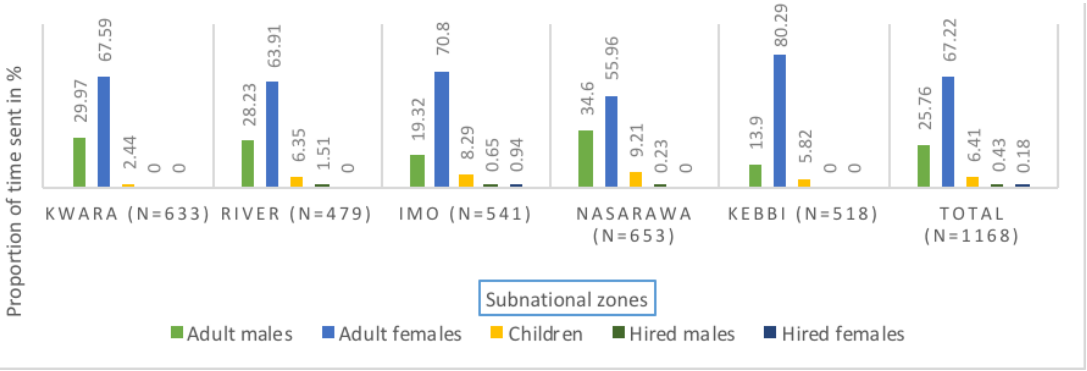
Note: The numbers in parentheses are standard deviations.

Proportion of time spent in chicken production

The per cent of the total time devoted to chicken production by adult males, adult females, children and hired people are presented in Figure 7. The results of the data reveal that across all subnational zones, the adult females devoted most of their time for chicken production compared to other household members and hired labour. Next to adult females, adult males spent most of their time for chicken production compared to children and hired people. In Kebbi, Imo, Kwara,

Rivers and Nasarawa, out of the total time devoted, adult females in the household contributed 80.29%, 70.8%, 67.59%, 63.91% and 55.96% of their time for chicken production, respectively (Figure 7). For the entire sample, adult females in the household spent 67.22% of their time for chicken production (Figure 7). This result implies that chicken production and management is largely the responsibility of adult females in the household compared to the rest of the family members. The proportion of time spent by other household members (children and hired people) is very small, which implies that their participation in poultry management is minimal. The low participation of children and hired people is not a surprise since today, children spend most of their time on education, and hired people invest most of their time in high labour-demanding activities such as ploughing and looking after large livestock.

Figure 7: Proportion of time contributed to chicken production in per cent in Nigeria (2015–16).



Source: Household baseline survey 2015–16

3.5 Chicken marketing

Live-bird marketing

The market channel, number of households using each of the market channels, number of birds sold and the total revenue from sale of birds in the last three months are presented in Table 18. Generally, the results of the data indicate that the village market is the largest market channel, used by 293 households for selling chickens in the last three months. On average, 4.45 of the birds were sold in the village market channel. The second largest channel in terms of number of households used is the individual (fellow farmer) channel; 202 households used this marketing channel. However, in terms of the number of birds sold, the restaurant channel is the highest compared with other marketing channels. On average, 6.4 birds were sold in this channel. City market, butchery, shop and trader's market channels are also important market outlets in which, respectively, on average 5.76, 3.67, 5 and 5 birds were sold. The results in Table 15 indicate that out of the total sample households, 656 households used the different market channels. Overall, on average 4.6 birds were sold in the different market outlets for which households received an average sales revenue of NGN 3,604.43 (Table 18).

Table 18: Marketing of chicken (last 3 months) in Nigeria (2015–16)

Description of items	Market channel and number of households using the channel								
	Individual n=202	Traders n=100	Village market n=293	City market n=46	Butchery n=3	Restaurant n=5	Shop n=1	Other n=6	Total N=656
Number of birds sold	4.35	4.99	4.45	5.76	3.67	6.40	5.00	2.67	4.59
	(4.83)	(5.80)	(4.20)	(7.92)	(1.53)	(3.36)	(0.0)	(1.86)	(4.97)
Sales revenue	3,436.00	3,477.37	3,735.56	3,929.27	3,500.00	2,960.00	7,500.00	1,100.00	3,604.43
	(2,906.31)	(2,841.15)	(2,807.16)	(2,995.91)	(2,051.83)	(1,178.13)	(0.0)	(0.00)	(2,841.72)
Transport cost	11.36	5.26	197.92	264.86	50.00	73.33	(0.0)	(0.0)	173.54
	(49.25)	(22.94)	(711.50)	(264.49)	(70.71)	(23.09)	(0.0)	(0.0)	(616.07)

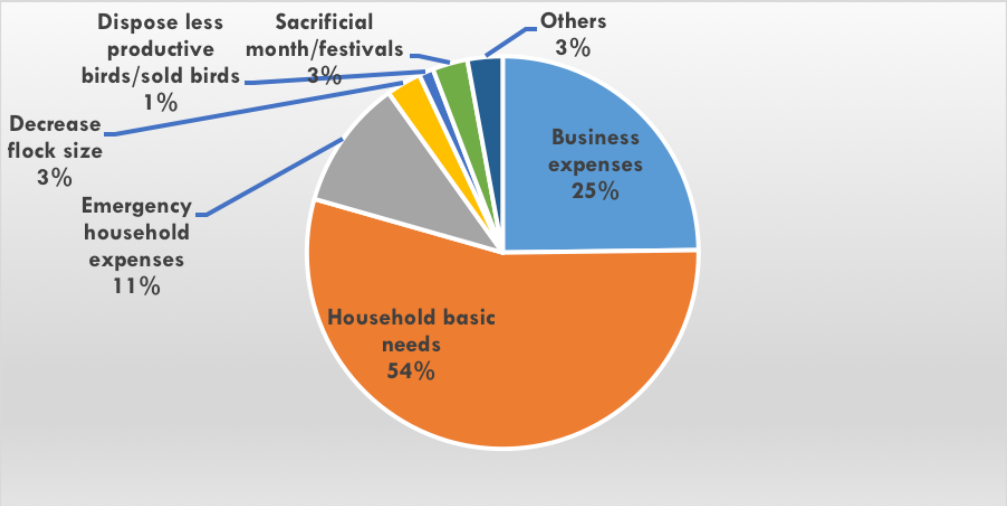
Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

Reason for selling live birds

In this study, an attempt was made to explore the reasons why households sell their chickens. Households described seven essential reasons. The majority of the sample households (76%) reported that the main reason for selling chicken was to use the money for covering household basic needs. Decrease flock size (7%), business purposes (7%), emergency household needs (3%), sacrifices for festivals (3%) and disposal of less productive birds (2%) were the other reasons for selling birds (Figure 8).

Figure 8: Household reasons for selling chicken in Nigeria (2015–16).

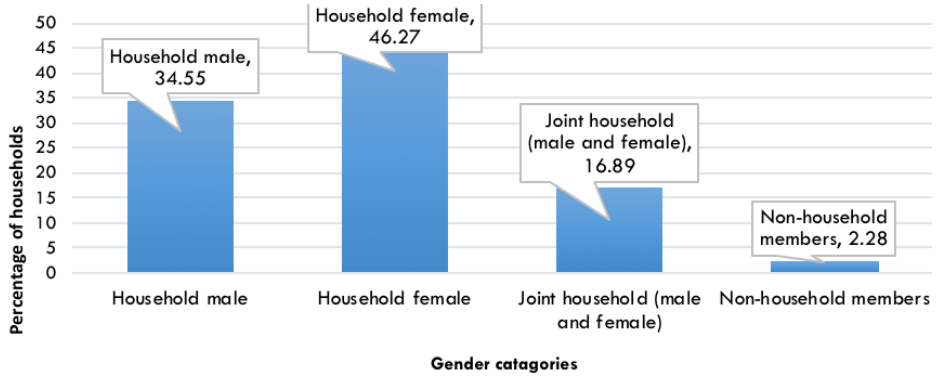


Source: Household baseline survey 2015–16

Gender role in live bird sells

The distribution of decision-making regarding who decides to sell chickens among women and men was explored in the survey. The result of the analysis (Figure 9) indicates that 46.27% of the households reported that the household female decides on the number of birds sold compared to 34.55% of men, with 16.89% of the households reporting that decision-marking was made jointly (female and male). Non-household members had very little decision-making role regarding the number of birds sold in the last three months.

Figure 9: Role of gender in selling chicken in Nigeria (2015–16).



Source: Household baseline survey 2015–16

Egg marketing

The marketing channel, average egg price, average number of eggs sold and the egg sales per week are presented in Table 19. Generally, the results of the data indicate that the individual market is the largest market channel, which 50 households used for selling eggs per week. On average, 6.46 eggs were sold in the individual market outlets. The second largest channel

in terms of number of households used is the village market channel, which 20 households used. However, in terms of the number of birds sold, traders is the highest-used channel. On average, 15.33 eggs were sold in this channel. Village market and shop are also important market outlets through which, respectively, on average 10.95 and 4 eggs were sold. Moreover, the results indicate that out of the total sample households, a total of 79 households used the different market channels per week.

The results also indicate that, overall, on average 8.14 eggs were sold in the different market outlets per week for which households received an average sales revenue of NGN577.4. We also assessed the average egg price per week in the different market outlets. The results of the data indicate that the average price for eggs varies depending on the market channels, ranging from NGN19.17 to NGN50. The lowest average egg price was reported in the traders; market outlet, where on average households sold eggs NGN19.17. The highest egg price was described when households sold eggs in the shop where on average they sold at NGN50. However, the overall result indicated that households sold eggs on average at NGN37.56 per egg. In addition to average egg price per week, this study also investigated the average number of days in which households sold eggs per week. For the entire sample, households on average sold eggs 2.68 days per week.

Table 19: Egg marketing (per week) in Nigeria (2015–16)

Description	Market channel and number of household using the channel					
	Individual n=50	Traders n=6	Village market n=20	Shop n=1	Other n=2	Total n=79
Egg price	40.54	19.17	33.75	50.00	50.00	37.56
	(13.17)	(6.85)	(13.27)	(0.00)	(0.00)	(14.01)
Days sold per week	2.86	2.17	2.50	3.00	1.50	2.68
	(1.64)	(0.41)	(1.19)	(0.00)	(0.71)	(1.46)
Average eggs sold	6.46	15.33	10.95	4.00	2.50	8.14
	(9.84)	(11.99)	(8.15)	(0.00)	(2.12)	(9.75)
Average egg sales	488.30	612.50	823.75	600.00	225.00	577.41
	(545.85)	(549.3)	(706.76)	(0.00)	(247.49)	(594.06)

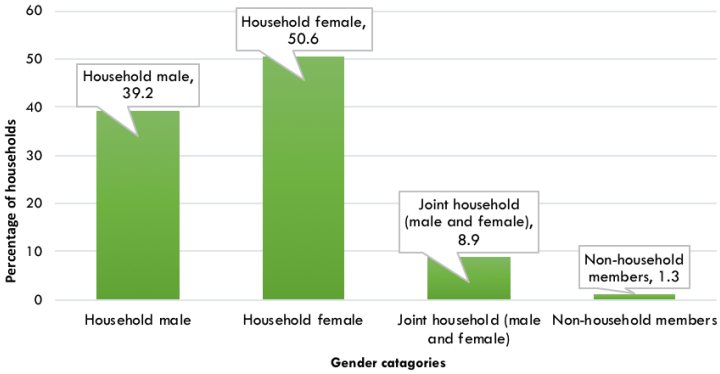
Source: Household baseline survey 2015–16

Note: The numbers in parentheses are standard deviations.

Gender role in egg sales

Decision-making power in households regarding the sale of eggs was addressed in the survey. The results of the analysis presented in Figure 10 indicate that 50.6% of the households reported that the household female decides on the number of eggs sold, while 39.2% of the households stated that the household male decides on the number of eggs sold. Only 8.9% of the households reported that the decision to sell eggs is made jointly (male and female). Non-household members had very little decision-making role regarding the number of eggs sold.

Figure 10: Role of gender in selling eggs in Nigeria (2015–16).



Source: Household baseline survey 2015–16

4. Constraints and opportunities

The results of the baseline survey will be used to identify constraints and opportunities of chicken production for ACGG future research and development interventions. The results indicate that farmers prefer the local breeds over other breeds irrespective of whether they kept the breeds or not. This is a potential constraint in Nigeria because of a problem in distributing tropically- adapted exotic breeds. However, it is also an opportunity, since it directs us to incorporate the local improved breeds in Nigeria (e.g. Shika Brown, FUNAAB Alpha and Fulani). The other constraints include the small proportion of female-headed households. The small proportion of female-headed households presents difficulties in the comparison of variables between the male and female groups. But, compared with the constraints, the opportunities are many. First, households report practical experience of keeping local, exotic and improved breeds, which makes the distribution of the improved breeds to households relatively easy. Second, households existing practice of giving supplementary feed for their chickens is an opportunity, since ACGG can implement the longitudinal study with minimal training of households on the preparation of supplementary feed. Finally, opportunities exist regarding households' availability of different classes and types of chicken, as well as households' familiarity with the management of these flocks.

5. Conclusions

This short summary report of the baseline survey provides baseline situations in all subnational zones of the ACGG project in Nigeria. Most importantly, it includes baseline characteristics of randomly selected households from all subnational zones. Since the households are representative, the results obtained from this study provide the underlying situations in the project villages and basic reference for the design of the on-farm study across the project subnational areas regarding women's level of participation, flock composition, chicken supplementary feed, smallholder farmers' preferences regarding different breeds of chicken and farmers' perception of the good qualities of cocks and hens.

For the on-farm study, we highly recommended that female-headed and poor households should be adequately represented since the representation of these households in the baseline survey is not adequate. Therefore, for the on-farm study, householder was adopted instead of household head, where a householder is defined as the person who actively engages in the chicken production activities. In many cases, this will not be the household head as the project particularly focuses on the role of women in chicken production.

The survey result allowed us to fully appreciate the realities on the ground that chicken keepers experience, and the extent to which housing and supplementary feed are important for the on-farm study design. This was best reflected in the survey with mean age of length kept, average number of flocks per household and frequency of the existing practice of giving supplementary feed.

The study revealed that farmers prefer the local breeds together with exotic breeds, which potentially reflects the demand for exotic breed increases in the future. Thus, it supports ACGG objectives for distributing tropical adapted and productive chicken strains for the on-farm study.

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ISBN: 92–9146–560-7

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